



FRD Activities Report October 2004



Research Programs

Smart Balloon

The Sensirion SHT75, a miniature, single chip, digital temperature and relative humidity sensor (Fig. 1) has been integrated into a data acquisition system to compare its performance against the much larger and more expensive Vasaila HMP45 temperature and relative humidity sensor. The Sensirion is being evaluated for incorporation in the smart balloon as a replacement for the

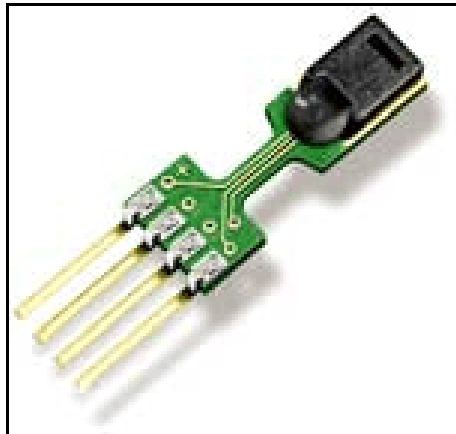


Figure 1. SHT75 Temperature and RH Sensor.

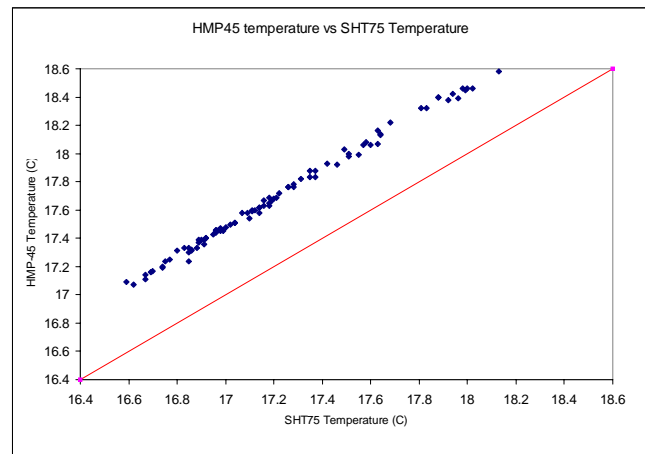


Figure 2. Comparison of the HMP45 temperature sensor with the SHT75 temperature sensor.

heavier and power-hungry HMP45. Initial testing took place in the high bay shop area where temperature and relative humidity variations are in a fairly narrow band. Preliminary results indicate that the SHT75 is typically within 0.5 C of the HMP45 and within 0.2 C of a reference thermometer with 0.1 degree accuracy (Fig. 2). Relative humidity under the same conditions show the HMP-45 and SHT75 track within 3% of each other. Further testing over a wider range of temperatures and relative humidity will take place at a later time. (Randy Johnson, 208 526-2129)

ET Probe

A more thorough analysis of the ET hurricane data collected this season has started. This includes the use of quality-analysis procedures to flag bad or suspect data. The wind data analyzed so far (mainly from Hurricane Frances) appear to be of high quality, with very few points being flagged due to rain spikes or other problems. At the beginning and ends of the data sets there tends to be more wind data points flagged simply because the wind speeds were close

to the lower threshold (~5-8 m/s) for proper operation of the ET probes. The temperature data tend to have more problems than the wind data. During some periods water intruded into the temperature sensors' electronics within the mushroom housing and caused voltage jumps that corrupted the temperature data. Water drops could also collect on the temperature sensors and cause a temporary data spike. Fortunately, the wind calculations are only weakly sensitive to the absolute temperature, so the temperature problems have little bearing on the quality of the wind data. (Richard Eckman, 208 526-2740 and Tom Strong)

Battelle Aerosol and Process Technologies Group Site Visit

Kent Hofacre and James Odasso, from the Battelle Aerosol and Process Technologies Group, visited the Field Research Division to learn about our tracer sampling and analysis capabilities. They also discussed plans for FRD participation in a Spring 2005 DoD model validation study. We discussed options for sampling and analysis, modifications to our samplers, and strategies for optimizing the data for model validation. This project is the most recent in a series of FRD field programs in support of DoD and Homeland Security. (Tom Watson, 208 526-9397)

Tracer Analysis Facility (TAF)

Preparations are being made for the 2005 analysis year. An estimate of the projected sulfur hexafluoride calibration gases needed for the first projects to be done in March 2005 has been sent to the vendor. Normal time for calibration gas delivery is usually two months from the initial request, but in times of high demand it has taken as long as four months to receive calibration gases from the vendor. Therefore, due to the upcoming holiday season, the quantity, and the concentration ranges needed, it was felt that the vendor should be given as much lead time as possible. (Debbie Lacroix, 208 526-9997, and Roger Carter)

Work is being done on each of the automated tracer gas analyzers (ATGAS) to determine the greatest concentration range that can be measured in the least amount of time for the upcoming studies. The possibility of an indoor study has meant that each instrument will need to be tuned for higher concentrations, but still allow for concentrations on the lower end, although not at ambient concentrations. Sample loops, timing and attenuation issues will need to be determined ahead of time to quickly adjust each instrument to the needed range of concentrations. The goal is to have a large enough concentration range so that each sample will need only one analysis rather than being re-analyzed using a different ATGAS calibrated with a higher concentration curve. (Debbie Lacroix, 208 526-9997)

Testing has begun on the gas divider to be used for diluting sulfur hexafluoride standards. Initial tests have shown that it is extremely fast and easy. Eleven standards can be made in less than 15 minutes. Although most of the time the dilution concentrations were within 90 per cent of the calculated concentration, there were times when the analyzed value was 70-80 per cent of the calculated concentration. Work is being done to identify and fix these discrepancies and determine the concentration limitations for the instrument. The goal is to be able to use the divider to dilute concentrations so that the number of calibration cylinders can be reduced, and to use it as a backup in the field for making concentrations of standards if needed. (Debbie Lacroix, 208 526-9997)

In response to a request from a potential experiment sponsor, we are examining the possibility of modifying the Programmable Integrating Gas Sampler (PIGS) to allow for different sampling times on each bag and for delays between bags. The sampling and analysis system used by FRD is totally integrated and automatically matches information about the sampling and sample timing with each analysis done in the laboratory. Any change in the operation of the samplers requires changes in the hand-held downloaders, the analysis system, and all interface software. Consequently, this modification will be a significant effort. The firmware in one of the samplers has been modified to handle the new sample timing and is being tested. The software in the hand-held computers used to program the samplers is being analyzed to see if it can be modified to support the more complex timing. (Roger Carter, 208 526-2745)

Cooperative Research with INEEL

Emergency Operations Center (EOC)

The last requalification drill was held on October 13th. Randy Johnson and Rick Eckman participated and were requalified as emergency response operations staff. Other FRD EOC teams were requalified at the September sessions. The training covered a number of topics including event classification, notifications, log keeping, usage of communications equipment, and recovery operations. (Rick Eckman, 208 526-2740 and Randy Johnson)

An Emergency Operations Center Drill was held on October 27. The scenario involved a roof collapsing at RWMC (Building 697) as a result of heavy snow accumulation. Some radiation was released. Workers were evacuated to WMF. Jason Rich and Randy Johnson provided meteorological support for the drill.

DOE Upgrade From RTMS to Loggernet Software

Semiannual calibration and maintenance on the DOE Mesonet data gathering system is complete for fall 2004. During the month of October four test stations were added to a new data acquisition system to test new radio communications hardware and software. By the end of the month, six real stations were taken off of the RTMS system and moved over to the new Loggernet software system. The new system is based on the Campbell Scientific Inc. (CSI) Loggernet software and is an upgrade to the existing CSI RTMS software that has been in use over the past 12 years. A new radio frequency is being used which will allow the operation of the existing RTMS system while the new Loggernet system software is being phased in. This will all be done with minimal loss of data as each station is switched from RTMS to the new Loggernet system.



Figure 3. Mesonet station enclosure for data acquisition system.

The existing CSI CR10 dataloggers will be replaced with CSI CR23X dataloggers. The older smaller station equipment enclosures will be replaced at the same time with larger enclosures to better fit all of the sensors and allow for limited future expansion. The transition to the new equipment and software is expected to take about two months. (Randy Johnson, 208 526-2129, Tom Strong, Shane Beard and Vance Holley)



Figure 4. Mesonet station enclosure showing data collection components.

Mercury from Mt. St. Helens Volcano

A new possible research project is being investigated with the Atmospheric and Surface Science Laboratory at INEEL. This involves an effort to monitor mercury emissions from the newly active Mt. St. Helens volcano. The INEEL team is planning to deploy mercury sensors downwind of the volcano. By combining the observations with dispersion modeling, it may be possible to estimate the mercury source term from the volcano. FRD may be running MM5 simulations together with the HYSPLIT dispersion model to provide estimates of the transport and dispersion of mercury from the volcano. Natural sources of mercury emissions are of considerable policy interest, since they must be known to properly assess the impact of anthropogenic emissions. (Richard Eckman, 208-526-2740 and Mike Abbott, INEEL)

Other Activities

HYSPLIT Model

Two FRD staff members traveled to Research Triangle Park in October to attend a training session on the HYSPLIT dispersion model. The HYSPLIT model is a strong candidate for a possible future upgrade of the dispersion modeling provided to INEEL. It already contains algorithms for surface deposition and radiological decay, and it has a more modern treatment of turbulent dispersion than what is used in the current MDIFF model. The training session provided an opportunity to investigate the various options available in HYSPLIT. A copy of the model has already been installed on a computer at FRD, and test runs have been made using output from the MM5 simulations that are routinely made at FRD. (Richard Eckman, 208 526-2740 and Kirk Clawson)

Safety

The National Institute of Occupational Safety and Health (NIOSH) video “Working With Stress” was shown at the monthly staff meeting. (Debbie Lacroix, 208 526-9997)

We were finally able to properly dispose of our accumulated hazardous waste materials after having funding pulled by the NOAA Environmental Compliance and Safety (ECS) office twice in two years. The waste included a handful of chemicals, over 2,000 smoke grenades (M-18s, M-8s), 31- ½ hour floating smoke pots, one 400-foot fuse, 2,000 Squibs, and 2,000 fuses. Since

the grenades were 20-50 years old, we chose to pay for the disposal cost of approximately \$56,000 using our own funds. Many of the grenades were rusting and deteriorating badly and provided a fire and safety hazard. The removal was performed by Tetra Tech out of Boulder, Colorado. They re-packaged the waste, arranged for two separate companies to pick up the waste and prepared the final shipping manifests. (Debbie Lacroix, 208 526-9997).

Travel

Kirk Clawson and Richard Eckman to Research Triangle Park, NC, October 20-23, for the HYSPLIT Model Training course

Training

Kirk Clawson and Rick Eckman, October 20-23, HYSPLIT Dispersion Model Training at ASMD, Research Triangle Park, NC.

Visitors

October 26: Kent C. Hofacre (Manager, Battelle Aerosol and Process Technologies) and James V. Odasso (Research Scientist, Battelle Aerosol Science and Technology Assessment).